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Inhalation device and protective casing.

An inhalation device comprising:

- (a) an inhaler (1) including a housing which comprises a mouthpiece and actuation means to prevent dispensing from the reservoir until a patient is ready to inhale through the mouthpiece, and,
- (b) a protective casing (1) surrounding the inhaler, the casing comprising a body portion (2) and a movable cover (3) which may be displaced to allow a patient access to the mouthpiece to use the inhaler, causing relative movement of the inhaler (1) and a biasing means (15) within the protective casing (1) thereby cocking the inhaler ready for use, characterised in that the cover (3) is pivotally attached to said casing (1) and a cocking link (7) is pivotally mounted at one end (8) to the cover and has a portion (9) in pivotal engagement with the inhaler or biasing means, whereby opening of the cover causes movement of the cocking link (7) and inhaler (15) relative to the biasing means (15), such that the pivot points (9,17) of the cocking link (7) and the pivot point (8) of the cover to the casing (3) pass through a straight line position to an overcenter position at which the inhaler device is cocked.

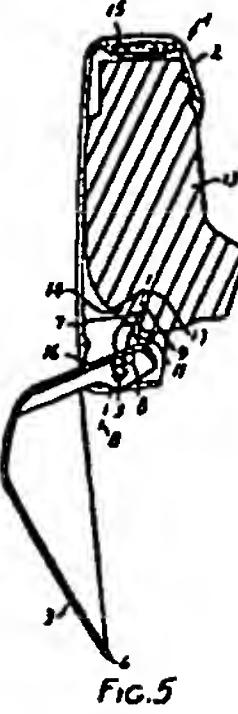


FIG. 5

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from the proximity of the user's facial structures, and is resistant to breakage at the mounting point resulting from accident or clumsy handling, and,

(b) movement of the inhaler within the casing is completed in a straight line substantially free of obstructions and with reduced likelihood of jamming.

The invention will now be illustrated with reference to the accompanying drawings in which:

Figures 1 to 5 represent an inhalation device comprising a medical inhaler having a protective cover casing incorporating a cocking mechanism in accordance with the present invention;

Figures 1 and 4 illustrate sections through the device with the movable cover in the closed position and the inhaler uncased;

Figures 2 and 3 illustrate sections through the device with the movable cover fully open and the inhaler cased for use;

Figure 6 illustrates a front view of the device in the cased position of Figures 2 and 3, and

Figures 8 and 7 represent partial sections through the protective casing of a device in accordance with the invention which is adapted to accommodate aerosol dispensers of different sizes.

The aerosol dispenser is cased in Figures 1 to 3 in more fully illustrate the cocking mechanism.

Referring to Figures 1 to 3 an inhalation device comprises a protective casing (1) adapted to receive a breath-activated aerosol dispenser, which casing comprises a body portion (2) and movable cover (3). Casing (1) defines a chamber (4) in which the aerosol dispenser (not shown for purposes of clarity) is located. Cover (3) is pivotally mounted about (5) allowing the patient to convert the device from an inactive closed form, in which the cover is in a horizontal position (as depicted in Figures 1 and 4), to an open form in which the cover is fully displaced (as depicted in Figures 2, 3 and 6). The act of opening cover (3) provides the cocking force for the aerosol dispenser and allows the patient access to a suitable port, such as a mouth or nasal adapter, through which medicament may be inhaled. The inhaler is maintained in the closed form while not in use providing a compact, comfortable shape minimising contamination from dirt and moisture (e.g., rain etc.). Cover (3) is advantageously provided with a stop (6) to positively retain the cover in its closed position.

The cocking mechanism comprises a wishbone bracket (7) which pivotably mounts (8) on cover (3), such that opening of cover (3) drives bracket (7) from a home position (depicted in Figure 1) to a fully displaced position (depicted in Figures 2 and 3). The direction and extent of bracket displacement is defined by the engagement of bracket

arms (9) and (10) with housing recesses (11) and (12) respectively. Recesses (11) and (12) are oriented such that displacement of cover (3) drives the bracket in a direction along the longitudinal axis of both casing and inhaler (represented by arrow 'A').

Referring to Figures 4 and 5, the aerosol dispenser (13) is located within chamber (4) by the provision of a groove (14) on the surface of dispenser (13) which pivotably engages the upper surfaces (17,18) of wishbone bracket arms (9) and (10) respectively, such that the aerosol container seats against coiled coiling spring (15), thereby stably seating the dispenser.

In use, the device is held in the hand such that the longitudinal axis of the body portion approximates to the vertical. Full displacement of cover (3) displaces bracket (7) to fit the dispenser in a straight vertical path, without any rubbing contact with the internal surface of the body portion, thereby compressing coiling spring (15). Subsequent retraction of spring (15) upon device activation, i.e., patient inspiration, provides the necessary force for displacing the aerosol valve relative to the outlet valve member. In an alternative embodiment, coiling spring (15) may be replaced by a deformable elastic chamber.

Body portion (1) and groove (14) are configured such that unidirectional movement of the dispenser is prevented during device insertion. For example, body portion (1) may be provided with one or more longitudinal spacer ribs (not shown) which project from the inner body surfaces to restrict lateral movement of the dispenser during day to day transport or accidental dropping by the user.

The dispenser may be removed for cleaning, treating class obstructions or replacement of a new aerosol valve upon exhaustion of the old, by the user simply lifting the dispenser against spring (15), sufficient to disengage groove (14) from bracket arms (9) and (10) and withdrawing the dispenser through the cover opening.

The extent of bracket displacement and hence its rotation in the dispenser is proportional to the extent of the initial opening of the cover. Maximum displacement (5) and therefore spring compression is completed by displacing the cover through about 150°, whereas fully opening the cover requires a displacement of about 100°. The cover thus moves a stepped movement when displacing the cover. During the first 150° of displacement the cover tends to compress the coiling whilst reaching a maximum where pivot point (8) passes through a straight line position defined by the upper surface (17) of bracket arm (9) and pivot point (5) (illustrated by dashed line B; Figure 6), to an overcenter position at which the device is cocked.

The device may then be converted between

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DEVICE

This invention relates to medical inhalers, and in particular to an improvement to the protective casing surrounding a metered dose inhaler, the casing comprising a body portion and a movable cover which, when displaced to allow the patient access to the device, acts as a cocking lever for the priming of the inhaler.

Medical inhalers comprising an aerosol vial containing propellant and medicament and equipped with a dispensing valve, e.g., a metered dose valve communicating with a mouthpiece, are known. Such inhalers may be incorporated in a housing including a breath-activated mechanism to synchronise dispensing of the medicament with inspiration by the patient. An example of such a device is commercially available from Minnesota Mining and Manufacturing Company, under the trade mark AUTOMALER and is disclosed, for example, in European Patent No. 147028.

Co-pending European Patent Application No. 8030229.3 discloses an inhalation device comprising:

(i) a breath-activated inhaler comprising a medicament reservoir mounted within a housing which comprises a mouthpiece and breath-activation means which prevents dispensing from the reservoir until a patient inhales through the inhaler;

(ii) a protective casing surrounding the breath-activated inhaler, the casing comprising a body portion and a movable cover which may be displaced to allow a patient access to the mouthpiece to use the breath-activated inhaler whilst it is within the casing, the breath-activated inhaler being removable from the protective casing and operable outside the casing.

The present invention provides a cover arrangement which primes the inhaler for use upon opening the cover.

According to the present invention there is provided:

(i) an inhaler including a housing which comprises a mouthpiece and actuation means to prevent dispensing from the inhaler until a patient is ready to inhale through the mouthpiece, and,

(ii) a protective casing surrounding the inhaler, the casing comprising a body portion and a movable cover which may be displaced to allow a patient access to the mouthpiece to use the inhaler, causing relative movement of the inhaler and a biasing means within the protective casing thereby cocking the inhaler ready for use, in which, the cover is pivotally attached to said casing and a cocking link is pivotally mounted at

one end to the cover and has a portion in pivotal engagement with the inhaler or biasing means, whereby opening of the cover causes movement of the cocking link and inhaler relative to the biasing means, such that the pivot point of the cocking link and the pivot point of the cover to the cocking link through a straight line position to an overcenter position at which the inhaler is cocked.

The cocking link provides a simple, robust and effective method of priming an inhaler for use, by co-ordinating the act of opening the casing cover with cocking of the inhaler mechanism.

Preferrably the cocking mechanism includes guide arms to define the movement of the portion of the cocking link engaging the inhaler or biasing means. Generally, the cocking link includes at least one guide arm, typically two, engaging a suitable slot or recess in the body portion of the casing.

Thus, the direction and extent of movement of the cocking link portion (and therefore the inhaler or biasing means) is partly defined by both the direction and length of the recesses. In a preferred embodiment the cocking link comprises a wishbone bracket having two arms, each arm engaging a corresponding guide recess in the body portion of the protective casing. The cocking link preferably seats directly on the inhaler.

The cover arrangement of the invention may be used with known metered dose or breath activated pressurised inhalers. For a conventional pressurised inhaler comprising a cylindrical aerosol vial containing propellant and medicament and equipped with a dispensing valve, the inhaler is intended to be used in a substantially vertical position, in which the valve is lowermost relative to the vial. The cover may either be pivoted about a point lower than the inhaler, or about a point above the inhaler. Movement of the inhaler is generally completed in a substantially vertical direction, along the axis of the inhaler. The cover arrangement may also be used with dry powder devices which require priming prior to use by the patient.

The cover arrangement of the invention is found to possess a number of advantages, e.g.:

(a) access to the aerosol dispenser and removal of the same, for cleaning purposes, treating class obstructions etc., is readily and simply effected without disassembly of the device;

(b) the cover, when fully closed, provides an effective seal restricting the ingress of contaminants, e.g., dirt or moisture;

(c) the cover is stable in the fully open position avoiding any tendency to close during use;

(d) when fully open, the cover is far removed

from the user's facial extremities;

Clamps

1. An inhalation device comprising:

(i) an inhaler including a housing which comprises a mouthpiece and actuation means to prevent dispensing from the reservoir until a patient is ready to inhale through the mouthpiece, and,

(ii) a protective casing surrounding the inhaler, the casing comprising a body portion and a movable cover which may be displaced to allow a patient access to the mouthpiece to use the inhaler, causing relative movement of the inhaler and a biasing means within the protective casing thereby cocking the inhaler ready for use, characterised in that the cover is pivotally attached to said casing and a cocking link is pivotally mounted at

one end to the cover and has a portion in pivotal engagement with the inhaler or biasing means, whereby opening of the cover causes movement of the cocking link and inhaler relative to the biasing means, such that the pivot point of the cocking link and the pivot point of the cover to the cocking link through a straight line position to an overcenter position at which the inhaler device is cocked.

2. An inhalation device as claimed in Claim 1 in which the cocking link portion is in pivotal engagement with the inhaler.

3. An inhalation device as claimed in Claim 1 or Claim 2 in which the inhaler comprises an aerosol vial containing propellant and medicament and equipped with a dispensing valve.

4. An inhalation device as claimed in Claim 1 or Claim 2 in which the inhaler comprises a dry powder inhaler.

5. An inhalation device as claimed in any preceding claim in which the device includes guide means to define the direction of movement of the portion of the cocking link engaging the inhaler.

6. An inhalation device as claimed in Claim 5 in which the cocking link includes at least one guide arm engaging a slot or recess in the protective casing to define the direction of movement of the portion of the cocking link engaging the inhaler.

7. An inhalation device as claimed in any preceding claim in which the cocking link comprises a wishbone bracket having two arms, each arm engaging a guide recess in the body portion of the protective casing.

8. An inhalation device as claimed in any preceding claim in which the movement of the inhaler is in the axial direction of the inhaler.

9. An inhalation device as claimed in any preceding

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the stable form; (b) fully closed and (c) fully open. Any intermediary position for cover opening is inherently unstable, such that the casing will tend towards either of the stable forms, depending on which side of the 150° step the cover pivots to. This prevents the cover from inadvertently snapping shut on the user's facial extremities once fully opened and allows the cover to be removed from obstructing the patient's chin. Additionally, the device is configured such that cover (3) abuts a stop (16) to provide greater resistance to breakage at the pivot of cover and housing as a result of mishandling or accidental dropping of the device.

The relative positions of the pivot points (5) and (10,12) allows the cover (3) to be shaped such that, when the cover is closed, the protective casing fully envelopes the inhaler restricting the ingress of contaminants.

Figures 6 and 7 of the accompanying drawings illustrate a breath-activated inhaler in accordance with the invention in which the protective casing (1) may be modified to accommodate aerosol vials of different sizes. The body portion (2) of the device has an aperture (18) through which a shroud (20) extends which accommodates the aerosol vial (not shown). A series of shrouds (20) may be fabricated having different lengths and, possibly, internal diameters, in order to accommodate various sizes of aerosol vials.

Whilst a cocking spring may be positioned within the top of the shroud (20) on a similar manner to the cocking spring (15) shown in Figure 4, to absorb and retain the cocking force applied when the cover (3) is opened, a cocking spring external of the shroud (20) may be employed. The shroud (20) is provided with a flange (21) and cocking spring (22) is positioned around the shroud (20) extending between the flange (21) and a stop (23) at the top of the protective casing (1). When the cover (3) is opened, the breath-activated inhaler, together with the shroud (20) is bent (Figure 7) compressing cocking spring (22). When the patient breathes through the mouthpiece, the breath-activated mechanism is triggered, causing the shroud (20) and aerosol vial downwards to fire the aerosol valve.

In a further embodiment of the invention (not illustrated in the drawings) the shroud (20) shown in Figures 6 and 7 may be dispensed with and replaced by a circumferential flange extending around the aerosol vial, supported in flange (21), against which cocking spring (22) will act. The circumferential flange may be fabricated as a separate component around the aerosol vial e.g., in the region of the neck of the vial. This arrangement will obviate the need for fabricating a series of shrouds to accommodate the different sizes of aerosol vials.

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claim in which the movable cover passes through at least 150° to the fully open position.

10. An inhalation device as claimed in any preceding claim in which the inhaler comprises a cylindrical val and dispensing valve intended to be used in a substantially vertical position with the valve downward.

11. An inhalation device as claimed in any preceding claim in which the cover is shaped such that when the cover is closed the protective casing completely envelopes the inhaler restricting the ingress of contaminants.

12. An inhalation device as claimed in any preceding claim in which the inhaler is breath activated.

13. An inhalation device as claimed in any preceding claim in which the blasting means is selected from a compression spring or a deformable elastic member.

14. An inhalation device as claimed in any preceding claim in which the inhaler comprises an aerosol val and the protective casing comprises a shroud surrounding the aerosol val.

15. An inhalation device as claimed in Claim 14 in which the shroud is movable within the remainder of the protective casing and spring biased to urge the aerosol val towards a firing position.

16. A protective casing for an inhaler, which casing comprises:

- (a) a body portion defining a chamber adapted to house an inhaler therein, the chamber including blasting means for cooling said inhaler, and,
- (b) a movable cover which may be displaced to allow a patient access to said inhaler, characterized in that the movable cover is pivotally attached to the casing, and a cooling line is pivotally mounted at one end to the cover and has a portion adapted to provide a pivotal engagement with said inhaler or blasting means, wherein the casing is constructed and arranged such that opening of the cover causes movement of the cooling line and inhaler relative to the blasting means, in which the pivot points of the cooling line and the pivot point of the cover in the casing pass through a straight line position to an alternative position, which movement may be used to cause relative movement between the inhaler and blasting means, thereby cooling the inhaler.

17. A protective casing as claimed to Claim 16 having one or more of the features as claimed in any one of Claims 1 to 15.

18. A protective casing as claimed in Claim 16 substantially as herein described with reference to the accompanying drawings.

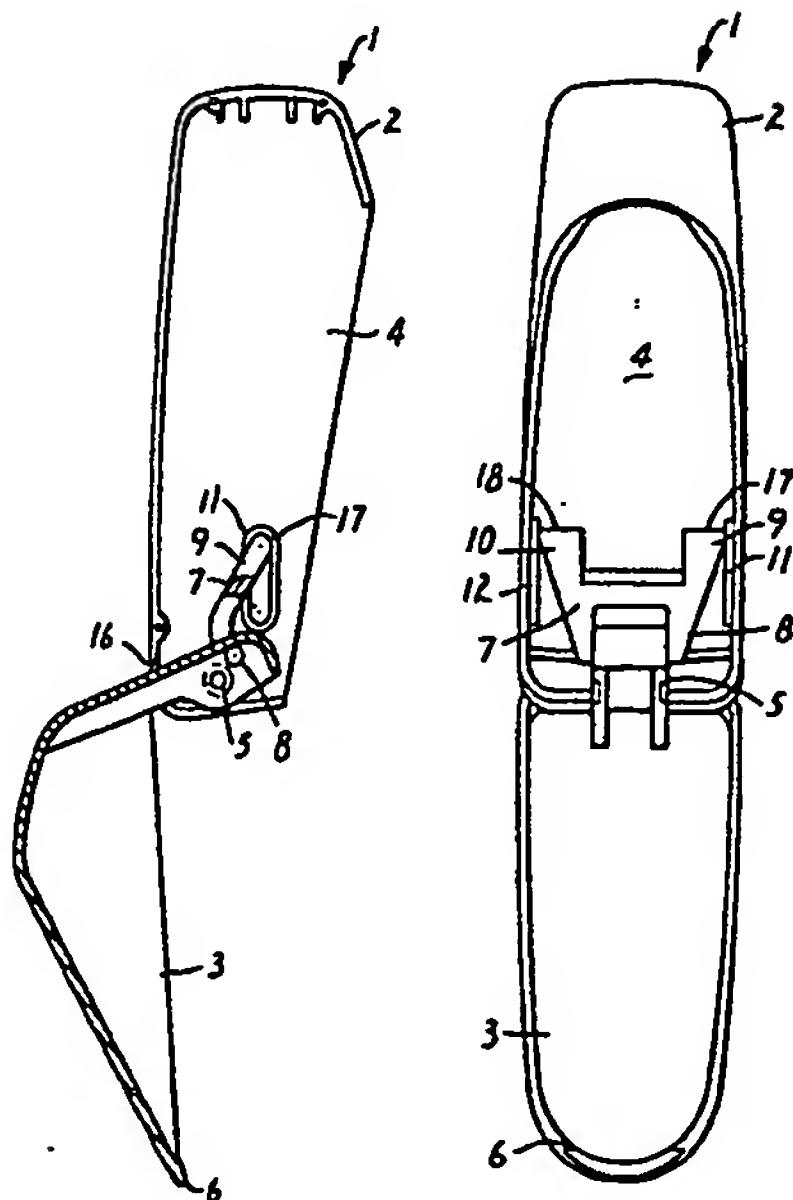
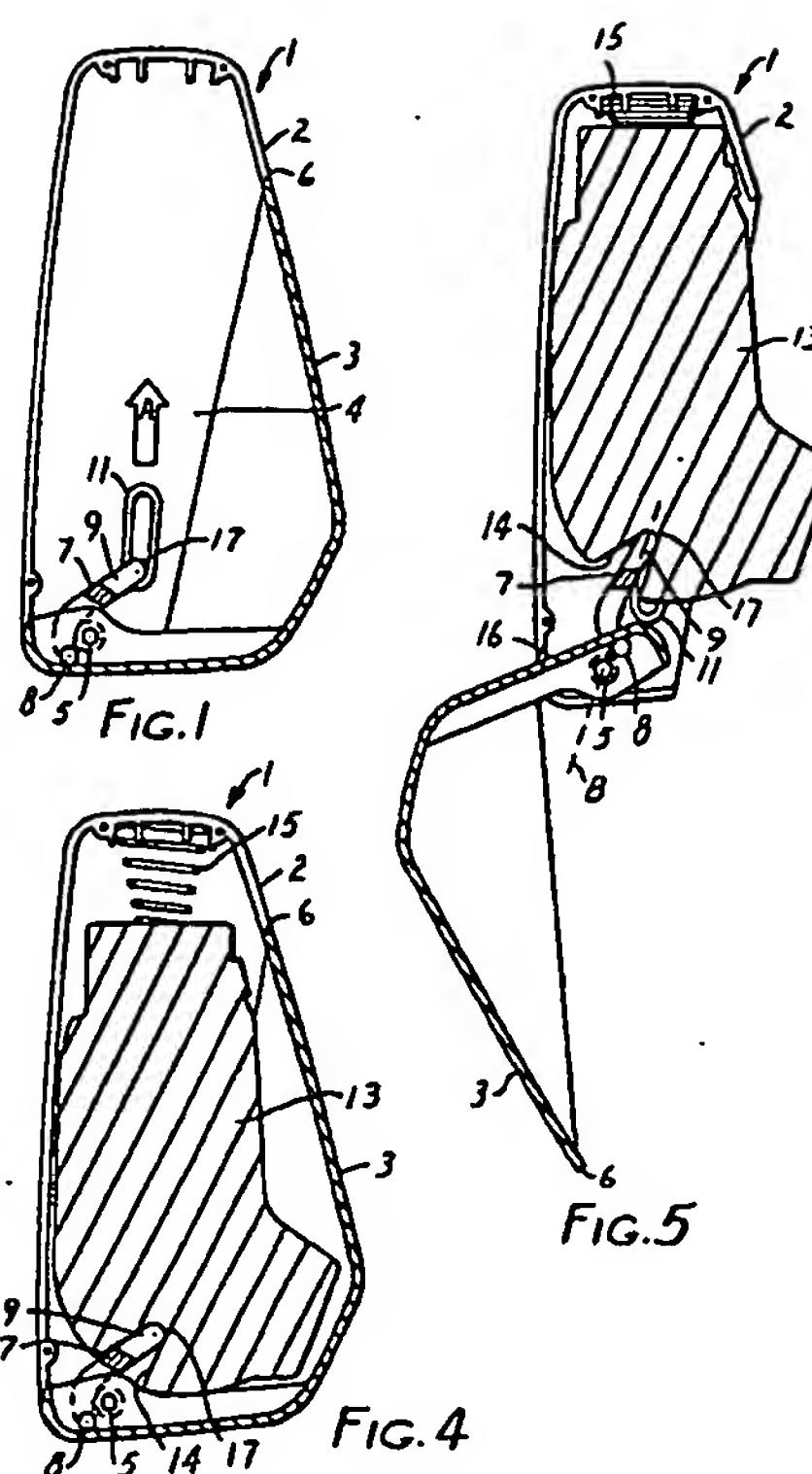


FIG. 2

FIG. 3

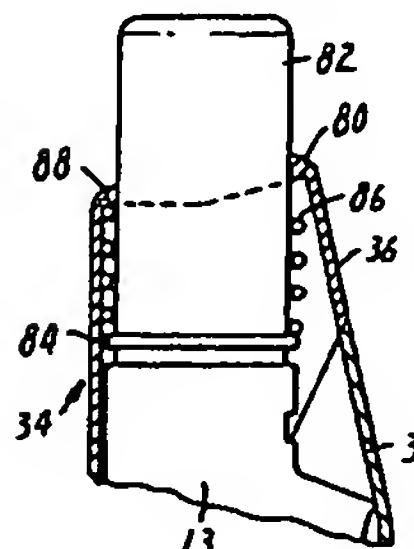


FIG. 6

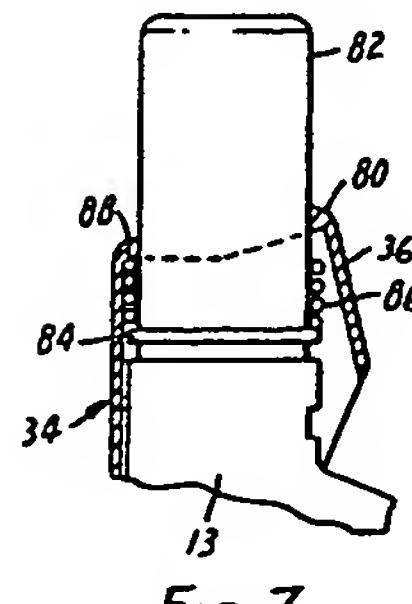
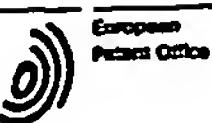


FIG. 7

EUROPEAN SEARCH
REPORTApplication Number
EP 90 31 2376

DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Character of document (with indication, where appropriate, of relevant passages)	Relevant to claim
A	FR-A-2 023 300 (FISER LAB. INC.) • Page 2, lines 13-22; page 10, lines 10-38 - - -	1,18
A	DE-A-1 917 912 (REXALL) • Page 6, lines 3-12; page 7, last paragraph - - -	1
A	FR-A-2 023 548 (CLAXO GROUP LTD) • Page 4, lines 15-38 - - -	1,18

The present search report has been drawn up by an examiner.

Date of search	Date of examination of search	Examiner
The Hague	07 January 91	GERARD B.E.

CATEGORY OF LISTED DOCUMENTS

I: particularly relevant if taken alone	B: further patent document, but published on or after the filing date
II: particularly relevant if combined with another document of the same category	C: document cited in the classification
III: relevant documents	D: document cited for other reasons
IV: informative documents	E: member of the same patent family, corresponding document
V: theory or principle underlying the invention	